MechaPhysics Executive Summary

Background

Mechatronics is a state-recognized secondary Career and Technical Education (CTE) program area organized under a STEM Classification in the Instructional Programs (CIP) codes. Mechatronics at the high school level is designed to introduce in an integrated approach the fundamental components of modern manufacturing technology including electrical, robotics, mechanical, fluid power, and thermal systems.

Traditionally, mathematics and science curricula have been treated as independent disciplines, taught using a theoretical model. Scientific and mathematical concepts are introduced, many times in a vacuum, with the expectation that the connection to the real-world will come days or weeks later. There is a need to integrate the concepts that will connect the theory with a relevant application in order to provide the learner with a frame of reference.

Physics and Mechatronics – MechaPhysics

The Mechatronics program of study provides students with hands-on training in modern manufacturing: electronics; fluid power; mechanical systems; electrical, computer, thermal, and sensor control; and robotics. Mechatronics employs an integrated approach to teach these concepts using practical applications to reinforce their relevance to the learner while developing skills to perform tasks. This course implicitly contains physics content that is both part of the Michigan Merit Curriculum and extends beyond the MMC by providing valuable real-world applications of advanced physics concepts.

The State of Michigan Office of Career and Technical Education has funded a project to map the Mechatronics and Physics standards to the Michigan Merit Curriculum. The course under development initially was designed to allow for the assignment of Physics credit for students enrolled in the CTE Mechatronics program. A team of Physics and Mechatronics instructors cross-walked the Michigan Merit Curriculum standards to the CTE Mechatronics standards. Since the correlation did not provide an exact match, a customized solution was identified to develop the physics content to closely align to the Mechatronic material. The result is a blended learning approach that provides practical applications of physics. The course titled, MechaPhysics, will provide CTE instructors independently or in concert with Physics teachers with a scope and sequence, content delivery, and practical applications meeting the essential Physics standards.

The project will be extended to allow for students enrolled in traditional Physics courses to benefit from the real-world connections and career training applications made available through Mechatronics. The resultant course design uses a blended learning model that will incorporate engaging e-leaning content with many practical applications. Because of the course's modular design, it can be implemented in total or components can be selectively chosen to reinforce physics' concepts.

Since the course under development will be delivered in part through a web portal, Michigan Virtual University will be available to facilitate the delivery of the content as well as to provide the initial professional development for instructors and administrators. There will be a menu of wrap around services that will facilitate the implementation of this course. These services include optional hardware acquisition, web services, and technical support through a third party.

MechaPhysics will be ready for a pilot in Macomb and St. Clair counties in Fall, 2015."